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of lead poisoning which occurred in 1914 among the rubber workers in the United States. Cases were also found of naphtha poisoning, and of poisoning from carbon disulphide, carbon tetrachloride and aniline oil. The dangerous nature of some of the compounds used in the rubber industry is not as yet commonly known, so that cases of industrial poisoning may occur without being recognized as such and ascribed to their true cause. Also, in the case of some of the compounds, the symptoms of poisoning may be obscure or may not develop until some time after the exposure has taken place, so that again the resulting harm may not be ascribed to its true cause. The investigation on which the bureau's report is based covered 35 rubber factories, located in fifteen cities or towns in nine states. Practically every branch of the rubber industry was included among the activities of these factories. The processes of rubber manufacturing are many and various and there is a great difference in the extent to which men and women employed in the different branches are exposed to the danger of poisonous dusts and fumes.

UNIVERSITY AND EDUCATIONAL NEWS

By the will of the late A. F. Eno, his residuary estate, which may be very large, is bequeathed to Columbia University.

THE American Association of University Professors will hold its annual meeting in Washington, D. C., on Friday, December 31, 1915, and Saturday, January 1, 1916. Besides routine business, the principal matters to come before the association at this meeting will be the final adoption of the constitution, and the presentation and discussion of the general report and declaration of principles of the Committee on Academic Freedom and Tenure of Office.

PROFESSOR CORNELIUS BETTEN, formerly with Lake Forest College, Illinois, is now on the faculty of the New York State Agricultural College, Cornell University.

HERMAN J. MULLER, a student in the department of zoology of Columbia University, has

been appointed instructor in biology at the Rice Institute, Houston, Texas.

DR. GEORGE VON PULLINGER DAVIS has gone to Salt Lake City as professor of physiology in the University of Utah.

DR. LEO LOEB has been appointed professor of comparative pathology in the medical school of Washington University.

DISCUSSION AND CORRESPONDENCE

THE POSITION OF REFERENCES IN JOURNAL ARTICLES

TO THE EDITOR OF SCIENCE: The subject of Mr. Heyward Scudder's letter in SCIENCE for October 1 (p. 454) is one that has long interested me as author, as editor and as secretary of the British Association Committee on Zoological Bibliography and Publication. I therefore venture a few comments on his proposals.

It happens that I have just had to see through the press an article furnished with references in the precise manner desired by Mr. Scudder. The article, however, was so long that it had to be spread over three monthly parts of the periodical to which it was sent. Thus, on the proposed plan, the reader of the first two parts would have to wait one or two months for the references—a course that was quite inadmissible. This illustrates one frequent objection to the proposals. Mr. Scudder himself admits others, even when the article is less lengthy.

There are two sets of people to be considered: on the one hand, the editor and publisher; on the other, the author and his readers. Mr. Scudder's main argument is the saving to the former, but the utmost saving that he claims does not amount to one per cent., and the average of all his actual instances shows a less saving than half a page in a hundred. That amounts to 31 sheets in an edition of 1,000 in octavo. The total pecuniary saving from the paper bill and the printer's bill would thus be about two dollars, which equals one fifth of a cent per copy. The more important journals, which begin each article on a fresh page, would rarely effect any saving in paper.

This trivial saving may, I venture to think, be disregarded, and the question decided purely in the interests of the reader. Now the reader wants one or all of three things: first, a speedy reference from the quoted statement to the authority; secondly, a name and a date that will appeal at once to his historical sense and furnish him with some idea of the present value of the statement; thirdly, a conspectus of the so-called "literature" arranged in some logical order. Whatever the merits of Mr. Scudder's proposals, they provide the reader with none of these things. Their merits are twofold: they get rid of references at the foot, which are expensive and encourage the vicious habit of putting matter into footnotes because the author will not be at the pains to rehandle his text; and they do away with *loc. cit.*, which is not merely wasteful, but more often than not erroneously used in place of *op. cit.* or *tom. cit.*

In offering counter-proposals it is advisable to distinguish between two classes of papers: first, brief articles in which the references are correspondingly few and rarely repeated; secondly, long articles or memoirs in which the references are correspondingly numerous and frequently repeated. In articles of the first class, references may quite easily be worked into the text, and can be repeated by giving the cited author's name, with a distinguishing date when more than one of his works has been mentioned. For memoirs of the second class it is certainly convenient for both author and reader to have a "list of works referred to" at the end (or sometimes at the beginning) of the memoir. But though it may save trouble to the author to number these works in the order of their citation, this will save nothing to the reader, for that order has often no meaning apart from the text. Here is an actual example: 1. Tegner, 1880. 2. Jespersen, 1913. 3. Johannsen, 1913. 4. Anon., no date. 5. Höfding, 1910. 6. Höfding, 1914. 7. Goethe, 1858. 8. (Another page of 3.) 9. Anon., 1873. 10. Rádl, 1913. 11. Bernard, 1867, and so on for nearly 100 items. To use such a list as a guide, or to look up an author in it, is difficult enough as it is, but would be more so if the items were sepa-

rated only by a 5 mm. space (a mutton-head, as our printers call it). The most convenient plan for subsequent reference is to give the authors in alphabetical order, with the papers by each in chronological order. The references in the text will then be simply: TEGNER (1880), GOETHE (1858, p. 279), CLAUDE BERNARD (1867), H. M. BERNARD (1896, p. 53). Such a mode of reference gives the historical perspective, and is of itself enough to save a reader familiar with the subject from repeated application to the list at the end.

So far as I can see, the methods here outlined (which have no pretensions to novelty) would meet all Mr. Scudder's requirements and need not cost more in either time or money.

F. A. BATHER

BRITISH MUSEUM OF NATURAL HISTORY,
LONDON, S.W.,
October 13, 1915

IN a recent number of SCIENCE¹ Heyward Scudder, in an article with the above heading, calls attention to the fact that from one half to one per cent. of the space in the majority of scientific journals giving many references is wasted by the faulty position and arrangement of the references. He recommends, as a means of saving this space, that each reference be given a number (the numbers to run consecutively) and that all references be printed at the end of the article, leaving an extra wide spacing between the period at the end of one number and the next number, in order to catch the eye.

It is quite possible that the method suggested would effect a small saving in space. It would seem, however, that the desirability of this method of giving references is open to discussion.

It must be conceded at the outset that the matter is largely one of personal opinion, and that one of the hardest tasks of a conscientious editor is to edit consistently the references of his journal. Furthermore, no two journals, unless published under the same supervision, have the same system of references. Certainly no two papers, unless by the same author, will give references in exactly the same way and

¹ SCIENCE, 1915, XLII, 454, October 1.

even in the same paper one may find differences. Because of this it is not surprising that all of us do not agree with Scudder.

Our position is stated in the directions given for the "Placing of References" as found in *Bibliographic Style*, published by the American Medical Association.

All comments or bibliographic references (except footnotes that concern the article as a whole) on various matters mentioned in an article should be used as individual footnotes, numbered consecutively throughout the article, each to be placed at the foot of the required column (or page), rather than grouped at the end as a bibliography. The latter method may be followed, however, if an author desires merely to give a general survey of the literature on the subject. When the same reference is used twice, instead of duplicating the note or using the words "*loc. cit.*," it is better to repeat in the text the reference number of the original note.

References are given for the convenience of the reader. In general they are specific in character and the reader desires to consult them in connection with the particular point in question and not in a general way. It is more economical of time from the reader's point of view to have references at the foot of the page, where they may readily be consulted, than at the end of the article, which necessitates the turning of an indefinite number of pages every time a reference is needed. This is especially true in those cases where it is necessary to find a reference to a particular fact. One looks through the article in question until the desired point is found and then, by glancing at the foot of the page, at once finds the reference.

While this is a personal opinion the writer finds that it is shared by a number of his fellow-workers. If the method suggested by Scudder is as convenient as he would have us believe, it is surprising that more of the journals written by and for busy scientific men should not have adopted it. To our knowledge the only journal that consistently uses Scudder's method is the *Biochemical Journal*.² The journal recently founded by Dr. V. C.

² This journal uses a modified form, since a separate line is given for each reference.

Vaughan, *The Journal of Laboratory and Clinical Medicine*, apparently uses, in part at least, the same system of reference-giving in the original articles (it may be at the author's discretion), but uses the more convenient form of references at the foot of the page in the editorial section.

Another point made by Scudder in favor of grouping references at the end of the article is that this method assists one in looking up original references, in that it saves time in the long run. References are individual and are found in different magazines or in different volumes of the same magazine. In the interval between looking up two original articles it is just as easy, or easier, to turn a page or two to find the next numbered reference, as it is to locate one's place in a running paragraph of references, printed in eight-point or even in smaller type.

In this connection it may be permissible to call attention to one aspect of the question which would really effect a saving of time. Much annoyance and loss of time is caused by the inaccurate quotation of references. The degree of inaccuracy may be either a wrong page number, a wrong volume number, or a wrong journal. Sometimes the error is easily corrected, but more frequently it is not. Because it is so easy to make mistakes of this kind, it is only just to the reader that all references be carefully checked in the manuscript and verified in the galley proof. In very few cases does the journal publishing the article verify the reference, so the burden and the blame usually fall upon the author.

As a rule, journals are desirous of pleasing their contributors and readers and will print references as given. The question of saving one per cent. of the space would probably give way to the question of convenience to the reader. Since each contributor has the right to decide for himself, we have felt it worth while to emphasize the old way of giving references, as opposed to Scudder's modification, especially since it seems to be by far the better way.

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